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Memorandum

To: Acting Field Supervisor, U.S. Fish and Wildlife Service, Albuquerque, New Mexico

From: Chief, Conservation Partnerships Branch, U.S. Fish and Wildlife Service, Albuquerque, New Mexico

Subject: Biological Opinion for Proposed Habitat Restoration and Chiricahua Leopard Frog Population Establishment

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) concerning the effects of habitat restoration and Chiricahua leopard frog (*Rana chiricahuensis*) (frog) population establishment on the Burro Cienaga Ranch (Ranch) through the Service's Partners for Fish and Wildlife Program (PFWP), Private Stewardship Grant (PSG) Program, on the threatened frog pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. § 1531 *et seq.*). Informal consultation in accordance with section 7 of the Act began on December 13, 2006, whereas formal consultation began with the March 6, 2006, Biological Evaluation (BE) for frog population establishment. PFWP has determined that the effects of the action "may affect, is likely to adversely affect" the frog. The Ranch is 12,000 acres (ac) (5,000 ac is deeded and the remaining is BLM and State leased) located south of Silver City and east of Lordsburg, New Mexico. A.T. and Linda Cole are the recipients of the PSG and are referred to as cooperators throughout this BO. As such, the cooperators are applicants to this consultation.

Consultation History

This BO will analyze the effects of stream restoration and establishment of two to three frog populations on private land in Burro Cienaga, Grant County, New Mexico.

This biological opinion is based on information submitted in the BE; discussions with PFWP staff; monitoring reports; phone call and e-mail conversations, and other information available to the Service.

A special rule under section 4(d) of the Act (67 FR 40790) states that take of Chiricahua leopard frog caused by livestock use or maintenance activities at livestock tanks located

on private or tribal lands would be exempt from section 9 Prohibitions. Two private stock tanks will be potential translocation sites to establish additional populations on the ranch.

BIOLOGICAL OPINION

I. Description of the Proposed Action

Action Area

The action area for the proposed project includes all areas directly or indirectly affected by the Federal action. For this consultation it is defined as the boundaries of the Ranch property and suitable habitat that is within the dispersal distance of one mile overland, three miles along an ephemeral or intermittent drainage and/or five miles (mi) along a perennial stream from the project areas where frogs will be introduced and/or translocated. The Cienaga Spring seeps out in the northern section of the Ranch. It is perennial for 1.5 mi and then goes underground and is intermittent for 4.5 mi downstream to the southeast. All of the perennial and intermittent sections of Burro Cienaga are within the property boundary.

Proposed Action

The proposed action is to restore riparian habitat on approximately 2 ac and establish frog populations on the Ranch with either wild or captive reared frogs. Under the PSG the landowners have agreed to maintain the project area for 3 years. Riparian habitat along Burro Cienaga will be stabilized by planting appropriate native willow species to preclude further cutting of creek banks by heavy flow events, and protect off-channel frog breeding and feeding sites. Planting will occur selectively along 0.50 to 0.75 mi of the creek. Immediately downstream of one of the live springs on the site will be augmented by scraping a 10 meter by 10 meter by 1.5 meter deep, off-channel pond behind a natural berm that already exists about 30 meters from the main creek bed. This off-channel refuge pond will be the focal site for frog translocations. For that reason the pond will be constructed as early as possible in the process to allow planted native aquatic vegetation to develop in the site prior to translocation. The proposed Patterson pond is located approximately 0.75 mi to the south of the off-channel refuge pond and a few yards from the creek (10 meter by 10 meter by 1.5 meter deep). Riparian and wetland vegetation will be planted along the perimeter. Both ponds will be fed from groundwater and well water.

Randy Jennings from Western New Mexico University (WNMU), New Mexico Department of Game and Fish (NMDGF) and the Service will be responsible for collecting frogs, eggs, and/or tadpoles. Collection activities will be covered by a 10(a)(1)(A) Scientific Collection Permit. The project proposal consists of collecting from Ash Spring in quantities that do not exceed 20 percent of the current available egg or tadpole segment of the frog population. The precise number of Chiricahua leopard frog eggs and tadpoles collected will depend on what is available and will not exceed a total of

500 eggs or 200 tadpoles. Eggs and tadpoles will be collected by experienced biologists with the appropriate State and Federal permits and moved to the frog enclosure. Standard precautions will be utilized to prevent the introduction of Chytridiomycosis to leopard frog populations at Ash Spring.

With the cooperation of the Chino Mine Company frogs/egg masses or portion of egg masses will be collected from Ash Spring (the closest frog population to the ranch, approximately 26 miles to the east). Ash Spring, on the Chino Mine property, is a tributary to Whitewater Creek and Lampbright Draw. The number and age class of frogs removed from Ash Spring is dependent on the population status. The earlier the life stage, the greater the numbers of individuals, and vice versa. More than 20 adults, greater than 10 juveniles, and more than 100 tadpoles were observed in 2005. The Ash Spring frog population appears to be relatively stable, and remains one of the best source populations for frog propagules within the southern Gila region (Jennings 2005). Reproduction is consistent from year to year. No bullfrogs (*Rana catesbeiana*) are present at Ash Spring and there is no evidence of the chytrid fungus (Jennings 2005). After the frogs/eggs masses are removed from Ash Spring they will be reared in captivity either at the Ranch or WNMU. The individuals will be reared to near metamorphic tadpoles or post-metamorphic froglets, and treated with icanazole to minimize the chance of transferring chytrid between sites. Propagules will then be transported to the enclosures on the Burro Cienaga after site preparation has been completed. The frogs will be held in the new habitat using nylon screen field enclosures until the frogs are acclimated.

Two large perennial stock ponds are within 1.5 mi of the focal translocation site along Burro Cienaga. When the frogs reproduce at the initial release site, the froglets will be translocated to the stock tanks to establish additional populations on the Ranch. These actions are contingent upon success of the initial translocation.

The riparian habitat along Burro Cienaga, two perennial stock ponds, the off channel refuge pond and Patterson pond are fenced to protect the frog from livestock impacts such as trampling or fecal contamination. The property line of the Ranch is fenced and maintained to keep out trespass cattle.

Throughout the three year project, populations will be monitored using diurnal and nocturnal surveys along Burro Cienaga and, when applicable, at stock tanks sites following Service survey protocols. Surveys will determine how effective translocation has been, and whether subsequent translocation will be possible, and will help identify natural movement of frogs out of the focal translocation site. Surveys will be conducted at least four times each year of the project. Copies of the reports will be sent to the New Mexico Ecological Services Field Office (NMESFO).

Conservation Measures

The proposed action is designed to contribute to the recovery of this species. However, capture, sorting, and handling stress and related (often delayed) mortality to the donor

and transfer populations of frogs can be limited to a great extent by using the following precautions [most of which apply to the 10(a)(1)(A) permit]:

1) Tadpoles and eggs will be held for less than one hour and released after temperature acclimation at the new location in order to reduce mortality from handling and transportation stress.

2) Tadpoles and eggs with apparent disease or parasites will be culled from the stock to be translocated.

3) Tadpoles collected by seine would not be "beached" but rather "bagged" and left in the water and dipped out as necessary.

4) Leopard frog egg mass and tadpole collection and transportation protocols will be followed.

5) The exclosures will be monitored by the landowners for trespass livestock and livestock will be promptly removed by the landowners.

6) No more than 20 percent of available eggs or tadpoles (not to exceed a total of 500 eggs or 200 tadpoles over three years) will be collected from Ash Spring to establish populations on the Ranch.

7) No grazing by livestock will occur in the riparian habitat along Burro Cienaga, the two perennial stock ponds, the off channel refuge pond, and Patterson pond.

II. Status of the species (Rangewide)

The frog was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002 (USFWS 2002). Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The frog is distinguished from other members of the Rana pipiens complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Stebbins 2003, Platz and Mecham 1979). Populations of frogs on the Mogollon Rim differ genetically from those in southeastern Arizona, but it is unclear whether the differences are great enough to recognize them as distinct species (Platz and Grudzien 1999, Goldberg et al. 2004, Hillis and Wilcox 2005). The Ramsey Canyon leopard frog (*Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it reportedly grows to a larger size and has a distinct call that is typically given under water

(Platz 1993). Recent genetic work suggests *R. subaquavocalis* and *R. chiricahuensis* may be conspecific (Goldberg et al. 2004).

The frog is an inhabitant of Cienagas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of northern and central Chihuahua (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997, Sredl and Jennings 2005). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae* and *R. leomosespinali*) in the southern part of the range of the frog. In New Mexico, of sites occupied by frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of populations extant in Arizona from 1993 to1996 were found in stock tanks (Sredl and Saylor 1998).

Die-offs of frogs were first noted in former habitats of the Tarahumara frog (*Rana tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983 to 1987, Clarkson and Rorabaugh (1989) found frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During subsequent extensive surveys from 1994 to 2001, the frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities (Sredl et al. 1997, Rosen et al. 1996, USFWS files). In New Mexico, the species was found at 41 sites from 1994 to 1999; 31 of those were verified extant during 1998 to 1999 (Painter 2000). During May to August 2000, the frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994 to 1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 75 percent of its historical localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom Cienaga complexes. In many of these regions frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently

disappeared from some major drainages in New Mexico (C. Painter and R. Jennings, pers. comm. 2004).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Loss of frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey et al. 2001). Numerous studies indicate that declines and extirpations of frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus spp., Lepomis spp.*), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Fernandez and Bagnara 1995; Snyder et al. 1996; Rosen et al. 1994, 1996; Fernandez and Rosen 1996, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported frogs. All waters except three that supported introduced vertebrate predators lacked frogs. Sredl and Howland (1994) noted that frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen et al. (1996) suggested further study was needed to evaluate the effects of mosquito fish, trout, and catfish on frog presence.

Recent evidence suggests a chytridiomycete skin fungi, *Batrachochytrium dendrobatidis*, is responsible for global declines of frogs, toads, and salamanders (Speare and Berger 2000, Longcore et al. 1999, Berger et al. 1998, Hale 2001). Although the cause of death is uncertain, a thickening of the skin on the feet, hind legs and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols et al. 2001). The proximal cause of extinctions of two species of Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely chytridiomycosis. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000). In Arizona, chytrid infections have been reported from four populations of frogs (M. Sredl, pers. comm. 2000), as well as populations of several other frogs and toads (Morell 1999, Davidson et al. 2000, Sredl and Caldwell 2000, Hale 2001, Bradley et al. 2002). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at three other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000). Die-offs occur during the cooler months from October-February. High temperatures during the summer may slow reproduction of chytrids to a point at which the organism cannot cause disease (Bradley et al. 2002). Rollins-Smith et al. (2002) also showed that chytrid spores are sensitive to antimicrobial peptides produced in ranid frog skin. The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte et al. 2000).

The role of the fungi in the population dynamics of the frog is as yet undefined; however, there is increasing evidence for amphibian population declines correlated with chytrid infections (Carey et al. 2003). It is clear that frog populations can exist with the disease for extended periods. The frog has coexisted with chytridiomycosis in Sycamore Canyon, Arizona since at least 1972. However, at a minimum, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population decline, and because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of frogs in Grant County, New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and frogs in Arizona and Sonora. However in both cases, symptoms of moribund frogs matched those of chytridiomycosis. The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for chytridiomycosis in Arizona (1972) roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona.

Epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into naive populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger et al. 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other factors that cause stress (Carey et al. 1999, 2001; Daszak 2000; Pounds and Crump 1994). Morehouse et al. (2003) found low genetic variability among 35 fungal strains from North America, Africa, and Australia, suggesting that the first hypothesis – that it is a recently emerged pathogen that has dispersed widely – is the correct hypothesis. If this is the case, its rapid colonization could be attributable to humans. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and American bullfrog in the USA and Uruguay) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni et al. 2003). Recently, retrospective analysis revealed presence of chytridiomycosis in African clawed frogs (*Xenopus laevis*) dating to 1938 (Weldon et al. 2004). Further evidence showed the disease was a stable endemic in southern Africa for at least 23 years before any chytrid-positive amphibian specimen was found outside of Africa. African clawed frogs were exported from Africa for use in human pregnancy testing beginning in the 1930s. Weldon et al. (2004) suggest that Africa is the origin of the disease and that international trade in African clawed frogs was the means of disease dissemination. Once introduced to the Southwest via escaped or released clawed frogs, the disease may have spread across the landscape by human introductions or natural movements of secondarily-infected American bullfrogs, tiger salamanders, leopard frogs.

Free-ranging healthy bullfrogs with low-level chytriodiomycosis infections have been found in southern Arizona (Bradley et al. 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, chytridiomycosis may be carried with them (Collins et al. 2003). Other native or nonnative frogs may serve as disease vectors or reservoirs of infection, as well (Bradley et al. 2002). Chytrids could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The Service, Arizona Game and Fish Department, NMDGF and WNMU are employing preventative measures to ensure the disease is not spread by aquatic sampling.

An understanding of the dispersal abilities of frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Rana pipiens*) commonly move up to 0.5 mi from their place of metamorphosis, and three young males established residency up to 8.4 mi from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the year northern leopard frogs successfully dispersed to downstream ponds 3.4 mi from the source pond, upstream 0.6 mi, and overland 0.6 mi. At Cypress Hills, a young-of-the-year northern leopard frog moved 13 mi in one year (Seburn et al. 1997). The Rio Grande leopard frog (*Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh 2005). After the first rains in the Yucatan Peninsula, leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. Movement may occur via movement of frogs or passive movement of tadpoles along streamcourses. The maximum distance moved by a radio-telemetered frog in New Mexico was 2.2 mi in one direction (R. Jennings, C. Painter, pers. comm. 2004). In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Rana blairi*) leopard frogs for 5 mi or more along East Turkey Creek in the Chiricahua Mountains. In August, 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 mi away. Rosen et al. (1996) found small numbers of frogs at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these

animals were populations 1.2 to 4.3 mi distant. In the Dragoon Mountains, Arizona, frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 mi down canyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (1.1 mi down canyon from Halfmoon Tank). There is no breeding habitat for frogs at Cochise Spring or Stronghold Canyon, thus it appears that observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.6 mi away, again, suggesting immigration. Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn et al. 1997). Displaced northern leopard frogs will hone, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Additional information about the frog can be found in Platz and Mecham (1979, 1984), Sredl and Howland (1994), Jennings (1995), Rosen et al. (1994, 1996), Degenhardt et al. (1996), Sredl et al. (1997), Painter (2000), and Sredl and Jennings (2005).

III. Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

A. Status of the species within the action area

While the frog is not historically known from the Burro Cienaga, historical localities are found approximately 20 miles to the north (South East Tyrone, Grant County) and approximately 26 miles from the proposed source population for translocation (Ash Spring, Grant County) (R. Jennings per comm. 2006). The Burro Cienaga is at the foothills of the Big Burro Mountains, within the Mimbres Drainage. Burro Cienaga is part of the same closed basin drainage system as San Vicente Wash, Cameroon Creek, Whitewater Creek, Lampbright Draw, and the Mimbres River, all with current or historical frog populations. Likewise the Burro Cienaga Site is found at similar elevations as these populations. These attributes make Burro Cienaga an ideal site for a translocation conservation project focused on frogs in the southern portion of its distribution in New Mexico. By establishing additional populations of frogs on the Burro Cienaga Ranch chances that chytrid or other perturbations will eliminate the genetic diversity contained in southern populations is reduced.

B. Factors affecting species environment within the action area

A general listing of threats that have contributed to the declining status of the Chiricahua leopard frog and that ultimately triggered the listing of the species as threatened is presented in the section entitled "Status of the Species". These threats are primarily human-caused factors.

In a previous consultation (Cons # 2-22-05-I-526) with PFWP, a Private Lands Agreement (PLA) was established to conduct restoration actions at Cienaga Springs and the spring-fed stream (Burro Cienaga) along a 1.5 mile reach in the northern part of the ranch. The goal of this restoration was to arrest erosion of the stream bed and restore the native riparian vegetation complex. Burro Cienaga is the only permanent natural source of water for many miles. Water seeps out of fine clay soil to fill pools surrounded by cottonwood trees, cascades down clay ledges, and disappears into the sand of a dry streambed, where the bed has eroded into a narrow and deep gully. The PLA restored eight head cuts to help maintain the perennial spring by raising the water table. Channel restoration work included the installation of rock to create a series of pools and riffles, designed to dissipate the energy of flood flows without filling with sediment. Willows were planted as an integral part of the structures to enhance stability and habitat value. A native riparian plant nursery was also created on the banks of the stream to provide plant materials for ongoing riparian restoration along the entire riparian corridor. Two historic wells were also repaired to provide supplemental water as needed to optimize growth of native vegetation plantings. Through this PLA with PFWP the land owners have agreed to maintain the project area for 10 years.

Recent surveys have found no crayfish, or non native frogs or fish. Efforts are planned for spring of 2006 to test for chytrid in *Hyla* and *Bufo* species.

IV Effects of the action

Effects of the action refer to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated and interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

The restoration efforts by the land owners and PFWP will have positive impact to the habitat and the frog. The Burro Cienaga Creek has quality habitat that the frog will benefit from. The seeps and springs allow for a complex aquatic habitat with food resources, sites for reproduction and cover from predators. Along with the 12 ac of restored habitat along the Burro Cienaga creek done through a previous consultation and the proposed 2 ac restoration of creation of two ponds the frog will benefit even more. The goal of the restoration is for the creek bed to be less sensitive to erosion through the head cutting and plantings of native willow species allowing for under cutting of the banks that the frogs use for hiding. The creation of ponds and vegetation around the

ponds will provide refuge from flooding events, breeding and feeding habitat and protection from predators. Since the frog is highly dependent on perennial waters the ponds will provide year round water. Habitat stabilization should improve even after initial restoration efforts because there are little impacts to the creek. Livestock are largely absent from the ranch and have limited access to water on the Ranch including many streams, springs, ponds and stocktanks.

Up to 500 eggs or 200 tadpoles will be "taken" from Ash Spring and moved to the Ranch or WNMU, and some animals could die or be injured in the process, or during rearing. No more than 20 percent of available eggs or tadpoles would be collected. A section 10(a)(1)(A) recovery permit will be amended or an new one issued from the Service for this activity. The permit will contain conditions to minimize adverse effects to the species in addition to Service protocols that will be followed. These protocols have been used extensively in leopard frog projects in Arizona and New Mexico. Typically little or no mortality occurs if the protocols are followed.

Some small number of eggs or tadpoles may be killed or injured during monitoring and occasional maintenance of the facility, including cleaning out excess vegetation or algae, and other maintenance. As with capture of tadpoles and egg masses, stress associated with monitoring or maintenance may result in some mortality. The facility will be in close proximity to either the landowners or faculty at WNMU, so opportunities for vandalism are few. As a result, we anticipate little mortality from these causes.

Chytrid fungus, which survives in wet or muddy environments, could conceivably be spread by humans traveling to from one site with contaminated footwear and equipment from mud or water to a second site. Chytrid could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, boots, or other equipment. Chytrid cannot survive complete drying, thus, if equipment is allowed to thoroughly dry, the likelihood of disease transmission is much reduced. Bleach or other disinfectants can also be used to kill chytrid (Longcore 2000). Chytrid, if not already present, could immigrate to the area naturally via frogs or other animals. Water, salamanders, and perhaps fish and crayfish could all be carriers of chytrid.

V. Cumulative effects

Cumulative effects include those of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7 and, therefore, are not considered cumulative in the proposed action.

Future non-Federal actions within the action area that are reasonably certain to occur include the continued restoration actions that the owners of the Ranch intend to do over the years including restoring a perlite mine site, installation of incision/erosion features on grasslands, stock tank restoration, reconfiguration of road surfaces, mesquite removal, fire treatments, planting of native vegetation, and non-native removal. The goal of these actions is to improve and restore the natural processes and systems throughout the Ranch.

The future projects have the potential to improve the quality of habitat for the frog and as well as other species and contribute as cumulative effects to the proposed action.

VI. Conclusion

After reviewing the current status of the frog, the environmental baseline for the action area, the effects of the proposed habitat restoration and population establishment, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the frog. No critical habitat has been designated for this species, therefore none will be affected.

The Service expects some adverse effects to the frog, but the proposed action will be mostly beneficial for the frog.

If successful, the proposed riparian restoration and population establishments will benefit the frog because they will: 1) provide year round water for breeding sites and serve as a refuge pond during dry periods and flood events; 2) the two perennial stock tanks are within the dispersal range of metamorphs that will allow for development of a metapopulation structure; 3) vegetative cover and rooted aquatic vegetation will allow for invertebrate fauna and potential prey for leopard frogs; and 4) provide as source populations for future reintroductions or population augmentation.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the PFWP and the cooperators under the PSG agreement so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. PFWP and the cooperators have a continuing duty to regulate the activity covered by this incidental take statement. If PFWP and the cooperators (1) fail to assume and implement the terms and conditions or (2) fail to

adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, PFWP and the cooperators must report the progress of the action and its impact on the species to the NMESFO Field Supervisor as specified in the incidental take statement [50 CFR 402.14(i)(3)].

Amount or extent of take anticipated

We anticipate Chiricahua leopard frogs will be taken incidental to the activities of collecting and transporting frogs, and operation of the rearing facility. Twenty eggs or tadpoles will be taken as a result of handling stress during movement of animals from Ash Spring to the facility and movement to the translocation sites, monitoring, and during maintenance on the facility.

If more than 20 dead or injured tadpoles or eggs are encountered, and their death or injury is attributable to the proposed action, incidental take will have been exceeded.

Effects of the take

In this biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the frog.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize take.

1. The PFWP and the cooperators shall ensure that frogs are protected on private property.
2. The PFWP and the cooperators shall ensure that frog habitat is monitored and protected on private property.

Terms and Conditions

In order to be exempt form the prohibitions of section 9 of the Act, the PFWP and the cooperators must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 1:

1.1 Monitor frog populations on private property and provide survey data to the NMESFO Field Supervisor within 90 days of collection.

1.2 If water levels are unable to be sustained by well water or the spring dries up contact the NMESFO Field Supervisor to determine the best water source or plan of action to maintain water levels for the frog or bring frogs into refugia.

1.3 Report any mortalities that occur to frogs, tadpoles or eggs to the NMESFO Field Supervisor with in 24 hours.

1.4 Check fencing to ensure that trespass livestock are not using these areas. If the fences are found to have been damaged they shall be immediately repaired. If any livestock are found within occupied frog habitat where they are not authorized to graze, they will be immediately removed.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 2:

2.1 Provide the NMESFO Field Supervisor an annual report, briefly summarizing the previous calendar year, 1) implementation and effectiveness of the terms and conditions, 2) documentation of take, if any, and 3) actual livestock use (head, animal months, dates of pasture use, utilization measurements, etc.) in occupied or potentially occupied habitat on private land with a description of any variations from the proposed action, 4) soil/watershed or ecological condition, at a minimum, shall be assessed by evaluating plant density, crown and litter cover, stubble height, and other soil stability characteristics(monitoring shall be sufficient to document changes in watershed and soil health) in occupied or potentially occupied habitat on private land and, 5) monitoring or research completed pertaining to frogs.

2.2 Eliminate or control point and non-point sources of contamination, and air-borne contaminants where possible on private property.

2.3 Minimize opportunities for introduction of non-native predators and disease and conduct non-native predator control where prudent.

2.4 Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be intentionally moved by the land owner, or their employees among livestock tanks or other aquatic sites.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The NMESFO Field Supervisor must immediately be notified about the causes of the taking and a review with PFWP and the cooperators and

NMESFO Field Supervisor will determine the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Animals

Upon finding dead, injured, or sick individual endangered or threatened species, initial notification must be made to the nearest Service Law Enforcement Office. In New Mexico, contact (505-346-7828) or the NMESFO (505-346-2525). Written notification must be made within 5 calendar days and include date, time, and location, photograph, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, remains of intact specimens of listed species will be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, information noted above will be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens will be made with the institution before carrying out of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any listed species survive treatment, we should be contacted regarding final disposition of the animal.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the Service to be kept informed of activities that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations. The Service recommends the following:

1. We recommend that the cooperators, section 10(a)(1)(A) permittee holder(s) and, PFWP coordinate with the Service in developing a long-term monitoring plan for repeated surveys.

2. We recommend to minimize take associated with maintenance of livestock tanks that all earthen tanks within the reasonable dispersal distance from initial translocation site or secondary sites will be surveyed for frogs prior to maintenance activities or construction of waterlots. Livestock ponds will be maintained, if possible, to avoid impacts to adult frogs, tadpoles, and eggs.

3. Where new or existing sites occupied by frogs occur, we recommend water shall not be hauled to the site from another aquatic site or tank that supports leopard frogs, bullfrogs, crayfish, or fish.

4. We recommend that if non-native aquatic organisms are found on the property, section 10(a)(1)(A) permittee holder(s), PFWP, and the cooperators work with the NMESFO Field Supervisor to begin an aggressive program to control them, particularly bullfrogs, nonnative fish, and crayfish.

5. We recommend protecting riverine and riparian habitat from significant grazing and trailing effects.

6. We recommend management actions should ensure that livestock are not congregating within stream corridors. Methods to be used can include, but are not limited to, temporary drift fences, gap fences, and herding.

Reinitiation-Closing Statement

This concludes formal consultation on the PFWP PSG for the Burro Cienaga. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service greatly appreciates the cooperators and PFWP efforts to identify and minimize effects to listed species from this project. For further information please contact Melissa Kreutzian (505) 761-4728. Please refer to the consultation number, 22420-2006-F-0044, in future correspondence concerning this project.

Sincerely,

Wally Murphy
Acting Field Office Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Field Supervisor, Fish and Wildlife Service, Phoenix, AZ

Director, New Mexico Department of Game and Fish, Santa Fe, NM
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, NM

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